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# NATIONAL BUREAU OF STANDARDS REPORT

10 364

ISO TC 92 SUBCOMMITTEE MEETINGS WG 2,4,7 SEPTEMBER 1970



U.S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS

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**NBS REPORT**

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**ISO TC 92 SUBCOMMITTEE MEETINGS WG 2,4,7 SEPTEMBER 1970**

by

I. A. Benjamin

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U.S. DEPARTMENT OF COMMERCE

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ISO TC92 SUBCOMMITTEE MEETINGS WG 2,4,7 SEPTEMBER 1970

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I. A. Benjamin

#### ABSTRACT

This report covers the actions of the following ISO TC92 subcommittees held in the Hague in September 1970.

- WG2 worked primarily with the further refinement of the non-combustibility test
- WG7 worked on studies on the time temperature curve; and the need to relate tests to national requirements
- WG4 is working on an ignition test, a rate of flame spread test, and a smoke test





REPORT OF TC92 SUBCOMMITTEE WG2  
(Meeting in Hague September 1970)

1.0 Present were:

*Herpol - Belgium	Bell <del>ess</del> on - France
Minne - Belgium	Amy - France
Malhotra - UK	Forrester - France
Guy - UK	Benjamin - USA
Rumberg - Germany	Lemly - USA
Di Biase - Italy	Zorgman - Neith <del>er</del> lands

\*Chairman

2.0 The following documents were introduced:

(Sec. 17) 59	Task group report on non-comb. test
(France 14) 57	Report on copper blocks
(Belgium 6) 62	Radiation of furnace walls
(USA 10) 63	Crucible test
(USA 11) 64	Studies on ISO non-comb. apparatus
(UK 7) 65	Copper block studies

3.0 The committee rose in respect to Mr. Malmstedt and voted to send condolences to his widow.

4.0 The negative vote of Germany (Sec. 15) 56 on draft recommendation No. 1715 was discussed. The basis of their objection was that the test had ~~not~~ been correlated by all the countries; and also it did not pertain to all materials. Italy mentioned they had also voted negative for the same reason. WG2 agreed that the test is not perfect and the committee is working on improving the method.

The secretary was instructed to write to Germany informing them that work is continuing on the method.

5.0 The committee agreed to appoint Malhotra as liason to IMCO to replace Malmstedt.

6.0 A task group under Dr. Rumberg had correlated all the current comments on the Rec. No. 1715. (Sec. 17) 59 and the bulk of the meeting was a discussion of this report.

6.1 Refractory tube - Germany can purchase 2.85 density tubes and can get them in larger diameters if needed. USA had just purchased 2.9 density tubes. Agreed to keep range to 2.7 to 3.3 density.

6.2 Diffuse cone and draft shield insulation.

USA mentioned that insulation would be important for control where only one winding is used, less so if 3 windings are used. Belgium and UK both indicated that wall temperature will increase about 10 to 20°C when insulation is used. Belgium and UK claimed they can get the uniformity required without any insulation. No decision was taken on this item pending further data and development of calibration techniques

### 6.3 Windings

UK felt that if we can define a calibration procedure we can leave out construction details. Germany felt that we should give suggested details. Belgium is now in favor of putting some suggestions in appendix. No decision till calibration procedure is developed

### 6.4 Calibration of furnaces

There are three possible approaches: copper blocks, wall temperatures, and standard reference samples.

- 6.4.1. Documents 49, 57, 65 of USA, UK and France on the copper block calibrations were discussed together. UK showed a big difference in cubes vs. cylinders where as France showed none. Note was made of the large difference in heat input between USA and France furnaces. UK suggested that the better insulated furnaces (less heat input) may have greater temperature drop. Germany suggested that we look at the cooling curve of the furnace.
- 6.4.2. Belgium reported on the study of the furnace walls with an optical pyrometer (DOC. 62). They pointed out that the location of the wall TC was critical in the range of  $\pm 1$  mm. Also they found large variations in the wall temperature for TC temperatures within the limit of the standard, possibly as a result of the sensitivity of the TC location.
- 6.4.3. The group decided to have everyone check the wall temperature of their furnace using the optical pyrometer method. The procedure will be to control the furnace with a central TC at 700°C then take horizontal and vertical traverse as well as measuring the wall temperature. The settings should meet the 60 mm level temperature requirement without the basket in place. Three vertical traverses are to be run: wall temperature, TC at 10 mm from wall, and TC at centerline.

USA suggested rerunning the copper blocks after the furnaces were reset with the centerline TC, since this may still be a useable calibration procedure. It was agreed to rerun the copper blocks with gold plate only. Also it was agreed to get the cooling curve of the furnace for the wall and center line TC with an empty furnace. All the data is to be sent Herpol and the secretary prior to next meeting. (Italy and Germany asked to join the experiment) (USA



will have two furnaces on which to run calibration).

- 6.4.4. A discussion was held on TC response time. UK mentioned that mineral wool can pass or fail depending on whether the TC has a cap. Document (France 15) 60E on this subject was discussed. Belgium and UK both agreed that the TC welded to the cap was no good and suggested the sketch in the recommendation be made mandatory. Everyone agreed to send Mr. Amy a sample of the TC they are using before October 1 and he will compare them.

#### 6.5 Furnace control

The wording in the English text was in error in R1182 and should read  $\pm 0.5\%$ . Also the final draft will clarify the wording to indicate that thermostatic control is not permissible.

#### 6.6 Thermocouples

It was agreed to specify the TC be opposite the side of the specimen and not the corner, also that the leg of the basket not be near the TC. Section 4.6 was to be modified to read:

" The free face of the specimen should be perpendicular to the plane passing through the axis of the furnace and the furnace thermocouple."

The number of TC's was discussed, with comments that the central TC is no good for glass and we should use one on each face. A discussion was then held on the IMCO test program on glass insulation. Everyone recognized that the test was being jockeyed to allow glass to be non-combustible. A suggestion was made that the temperature rise be coupled to a time factor e.g. maybe 10 seconds. The question of IMCO vs. ISO needs was also discussed. There was no decision on the number of TC's to be used.

#### 6.7 Holder

The weight of the holder was discussed. The group preferred an open type holder to a basket and questioned whether reducing the weight from 20 to 15g was significant.

#### 6.8 Wire screen on top

no decision

#### 6.9 Round vs. Square specimen

no decision

#### 6.10 Initial furnace temperature

The group agreed that 10 minutes at constant temperature was sufficient to determine furnace stability. France was to use the stabilized temperature after the test to determine the temperature rise. Italy and Belgium disagreed on what the magnitude would be. Herpol mentioned that when the test was originally set up the 50°C use was set to take into account the rise caused by the basket and the specimen. To take the rise after the test would be taking it into account twice. USA, Italy and France were to investigate what the temperature rise would be in the series of tests in 6.4.3.

#### 6.11 Flaming Criterion

Everyone agreed that flaming was not a good criterion since it was difficult to judge but they had originally wanted more than just a calorimetric test. Herpol was to review the original thinking on this subject.

- 6.12 France submitted document 60 which proposed that the criterion might be an integration of the area under the temperature rise curve, rather than just the peak temperature. US mentioned that this approach would be coming back to the potential heat test. Italy mentioned that they has submitted a similar proposal in document 42 but they suggested taking the area above the 50°C rise ordinate.

#### 7.0 Crucible test

USA document 63 on the crucible test was discussed, with the suggestion that a better calibration procedure was needed. France indicated they were working on this problem now.

#### 8.0 Summary:

The bulk of the discussion was on the improvement of the ISO non-combustibility test. The actions to be taken were:

- . a new program for calibration of the furnaces by using both an optical pyrometer and also the gold plated copper blocks. The results are to be sent to Herpol.
- . the response time of the TC's being used by the different countries were to be cross-checked by Amy
- . the cooling curve of the various furnaces was to be checked

the temperature rise after the test was to be checked for samples which has various residual volumes

- . Herpol was to review the basic thinking for the flaming criterion.

REPORT TC92 SUBCOMMITTEE W7  
(Meeting at the Hague September 1970)

1. Present were:

\*Herpol - Belgium  
Minne - Belgium  
Malhotra - UK  
Thomas - UK  
Guy - UK  
Di Biase - Italy  
Piermarini - Italy

Bellessen - France  
Amy - France  
Van Etteren - Netherlands  
Rumberg - Germany  
Benjamin - USA  
Lemly - USA  
Bartosnic - USA  
Pettersen - Sweden

\*Chairman

2. New documents introduced:

(Neitherlands 1) 19  
(Sweden 3) 20

Flame Spread on a building  
Study of the time temperature curve

3. Document (Sec. 8) 15, minutes of the last meeting was approved

4. A brief report was given of the CIB meeting in Paris.

The program on studying the thermal transfer properties of furnaces in fire tests, developed by Germany, has given contradictory information. Netherlands has proposed an improved method to study the problem.

4.2 The secretary was told to pursue setting up a liason between CIB and ISO

4.3 Note was made that CIB is starting to set up a system to collect information on casualties from fire and this information could be of value to WG7.

4.4 Note was made of the CIB discussion on non-combustibility tests, whether they are needed, and what they are measuring. WG7 agreed to discuss this at the next meeting and Von Elteren will prepare a paper on the subject.

5. There was a discussion on the need to standardize on how temperature and radiation measurements are to be made so that all the working groups might be consistent. There was a suggestion that a new working group on instrumentation be set up, with the idea that it might go to Mr. Amy's group on standardizing terminology.

6. USA reported that two different test procedures were being studied



to evaluate rate-of-release of heat from materials and constructions. Mention was made that papers on both would probably be given at the symposium which will be held at the plenary meeting in October 71.

7. The proposal to set up a questionnaire to determine the requirements of the various countries on test methods was discussed - to answer questions on the need for the tests TC92 is preparing. USA, UK and France agreed to individually draft questionnaires suggesting how this survey may be accomplished (ref. Document 17)
8. The subject of the need for tests to evaluate flame spread on exterior surfaces was introduced by Netherlands document 19. The paper reported on the flame spread which occurred on the face of a building which had bituminous coated steel sheets. The material had been rated of low flame spread. USA questioned whether the flame spread test was applicable to this situation. UK mentioned that we should consider three different situations for walls: an internal fire getting out and coming up the wall; an external fire spreading up the wall; and an internal fire breaking through the wall. More information is to be collected on this subject.
9. Petterson gave a short review of document 20, which deals with means for predicting the time-temperature curve, including consideration to the cooling cycle. UK mentioned the problem of the transition from cribs of varying porosity to real fire loads. Thomas then gave a summary of the CIB data indicating that both the temperature in the room and the rate of burning was a function of the ratio of the total room opening ( $A_T/A_w \sqrt{H}$ )
  - 9.1 A discussion was held on how this data might be useful to ISO. Sweden mentioned that their long range goal was complete rational design of fire resistance. US suggested that an immediate goal might be achieved if the curves that Pettersen showed in his paper could be translated into equivalent fire severity; Pettersen indicated that he would try to do this.
10. The next meeting of WG7 will be in conjunction with WG2 and WG4 the week of March 22, 1971 in Milan, with WG4 meeting the first of the week.
11. Summary:
  - . Van Etteren is to prepare papers on the meaning and need for non-combustibility requirements
  - . Draft questionnaires to determine each countries needs for test methods are to be prepared by US, UK and France.
  - . Pettersen is to try and convert his curves for heating and cooling with different fire loads into equivalent fire severity.



REPORT OF ISO TC92 SUBCOMMITTEE WG4  
(Meeting in the Hague September 1970)

1.0 Present were:

Forrester - France	Guy - UK
Bellesson - France	*Thomas - UK
Amy - France	Bowes - UK
Minne - Belgium	Odeen - Sweden
Bartosic - USA	Becker - Germany
Lemly - USA	Topf - Germany
Benjamin - USA	Zorgman - Netherlands
De Biase - Italy	

\*Chairman

2.0 The following new documents were introduced at the meeting

(France 12) 86	New method for measuring smoke
(USA 18) 87	Interlab report on SDC
(USA 19) 88	Spread flame tests
(USA 20) 89	Copy of ASTM D2843

A copy of BRI Report 33 by Kawague was mentioned and is to be sent to the members.

- 3.0 A moment of silence was observed for Mr. Malmstedt, who has died since the last meeting, in memory of his contributions to the committee.
- 4.0 The need for liason of WG4 with TC61, the ISO plastics committee was discussed (similar to the problems between ASTM committees E-5 and D20), since TC61 is working on fire tests. Dr. Becker was appointed as WG4 liason to TC61 with instructions to see that the scope of their standards is properly limited.
- 5.0 The next meeting of WG4 was set for March 22 and 23 in Milan.
- 6.0 Ignition

The chairman reported on the ad hoc meeting which was held in Paris in June to discuss the ignition test. He had previously mailed document 84 which summarized the work of UK, Germany and Austrailia; which showed descrepancies (we did not have a copy of the report.) The discussion indicated that discrepancies could occur from variations in spectral distribution, turbulence of the gases or specimen size. The philosophy of the test was stated by Thomas to be a measure of the tendency of a material to generate volatile gases. Australia, Document 66, has shown differences will occur due

to the nature of the ignition source.

- 6.1 Dr. Becker indicated that the German apparatus was deficient since it used a fixed rather than moving spark. Also the radiation changed as the glass cover got coated with smoke; and there was difficulty with thicker specimens.
- 6.2 The committee tacitly reaffirmed the need for an ignition test under high intensity radiation, with the statement that other types of ignition tests would be of interest. They agreed to standardize on one piece of equipment and to make it in one place for the initial trials. In further discussion this ended up with being the Australian equipment; their new model. JFRO is building a copy and will see about arranging for distribution of the heating elements to anyone who wants to build a copy.
- 6.3 A decision was made to run a round robin test on ignitability with samples supplied as follows: The samples should be equal to 2m

UK - gyp board  
- bitumen asbestos steel coated  
- hard board  
NBS - ceiling tile  
Bartosic- PVC sheet  
red oak  
Becker - polystyrene foam  
polyurethane foam

The following labs will build a copy of the Australian apparatus and participate:

Munich (2)	Australia
JFRO	Holland
Sweden	Di Biase
Bartosic	France - CSTB
Belgium	- Amy

It was also agreed that the pilot flame would be 5 mm above the surface and the length would be decided later. The tests would be run in pairs at 2 and 5 watts per sq. cm and the radiation would be checked after each test.

## 7.0 Spread of Flame

French document 75 and USA 88 were briefly described. (the French document had been distributed prior to the meeting) Netherlands had previously submitted a document on the subject. Netherlands and France had found ceiling observations difficult though we had found them the best. They preferred wall observations which we considered erratic.

- 7.1 A discussion was held on the test procedure and how the pilot flame should contribute to the fire. Italy and Netherlands preferred a vertical sample whereas UK and US felt a ceiling test may be preferable. Germany again reiterated its desire for preheating and a low radiation level. We suggested that two concepts may be valid and useable: one preheating to study rapid spread leading to flashover; and second a study of spread along the surface from small ignitions. Zorgman gave a report of a building fire that had occurred in the Netherlands in which bituminous coated steel contributed to the spread of flame up the face of a building.

Benjamin agreed to review the current data which had been submitted on flame spread.

## 8.0 Rate of Heat Release

Mention was made of the symposium being planned in conjunction with the plenary session of TC92 on this subject.

## 9.0 Smoke

Mr. Amy reviewed document France 82 which was the compilation of the questionnaire on smoke, and noted some corrections to be made to the tabulation: the comments will be circulated later.

Some observations were: everyone except Germany believed the test should reflect a real situation and that the test sample should represent the thickness used. UK is very firm on measuring cold smoke: in general there was great diversity on how to generate the smoke.

- 9.1 The decision was made that we divide the test into two parts and discuss each separately. One, on the method of generating the smoke; second, on the method of measuring it. Belgium is using a 10x10cm radiation at a 45° angle with a 20x30cm horizontal sample. France is using their standard radiator on a 50x50mm inclined sample. Both countries are testing in a large box with free burning. The French are also using a complex light transmission system to measure both direct and scattered light.

UK mentioned that two types of burning be considered: in free air at a fixed radiation level; and in an enclosure of limited air as they are doing in their fire propagation box. Forrestier stated that the surface area of the sample should relate to the volume of the box.

- 9.2 The working group agreed to outline a possible apparatus and have people report their experiences at the next meeting. The box will use a 20x20cm specimen with a holder similar to the fire propagation box. Specimen will be vertical and backed with cement-asbestos board. The level and type of radiation is being left open; but tests to be run with free burning and restricted air but with  $O_2$  not  $\leq 18\%$ . The smoke is to be moved into an adjoining area and measured with various dilution ratios. The samples used for ignition round robin are also to be tested for smoke. DiBiase agreed to review all existing smoke data. (See sketch attached).
- 10.0 Summary
- 10.1 A new apparatus for ignition is to be built and a round robin conducted.
- 10.2 US (Benjamin) is to review all the data so far on flame spread.
- 10.3 A new apparatus for smoke is to be built for experimentation and the materials used in 10.1 will be tested.
- 10.4 Several countries have commitments to supply designated materials; see 6.3.

USCOMM-NBS-DC



# Drawg of Smoke Apparatus







